Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A component comprising:

a silicon-based substrate; ~~and~~

a protective coating for the substrate, the protective coating including tantalum oxide (Ta_2O_5) and an additive for suppressing transformation from beta Ta_2O_5 to alpha Ta_2O_5;

wherein the amount of tantalum oxide is greater than about 40 mol%; and

wherein the protective coating is substantially crystalline and wherein a presence of CaO is eliminated.

2. (Currently Amended) The component according to Claim 1, wherein ~~coating includes a mixture of tantalum oxide (Ta_2O_5) and an~~ the additive is an oxide, compound, or precursor thereof, of an element chosen from the group consisting of Al, Hf, Si, Ln (rare earth including whole lanthanum series and yttrium) Mg, Mo, Ni, Nb, Sr, and Ti~~, and Zr~~.

3. (Original) The component according to Claim 2, wherein the coating further includes an additive selected from the group consisting of nitrides, carbides, borides and silicides.

4. (Original) The component according to Claim 1, wherein the substrate is one of a silicon nitride substrate and a silicon carbide substrate.

5. (Currently Amended) The component according to Claim 1, wherein the additive ~~includes~~ is aluminum oxide (Al_2O_3).

6. (Original) The component according to Claim 5, wherein the aluminum oxide is in the range of about 1-50 mol% during application of the coating.

7. (Original) The component according to Claim 5, wherein the aluminum oxide is based on starting material in the range of about 1-50 mol%.

8. (Currently Amended) The component according to Claim ~~1~~5, wherein the additive further includes La_2O_3.

9. (Original) The component according to Claim 8, wherein the La_2O_3 is in the range of about 1 -10 mol% during application of the coating.

10. (Original) The component according to Claim 8, wherein the La_2O_3 is based on starting material in the range of about 1 -10 mol%.

11. (Currently Amended) A component, comprising:

a substrate formed of silicon nitride or silicon carbide; ~~and~~

a ~~thermal~~ protective coating of crystalline composition on an outer surface of the substrate; ~~and~~

the ~~thermal~~ protective coating including a mixture of tantalum oxide (Ta_2O_5) and an additive of at least one of Al_2O_3 and La_2O_3;

wherein the amount of tantalum oxide is greater than 40 mol%; and

wherein a presence of CaO is eliminated.

12. (Original) The component according to Claim 11, wherein the Al_2O_3 is in the range of about 1-50 mol%.

13. (Original) The component according to Claim 11, wherein the La_2O_3 is in the range of about 1-10 mol%.

14. (Original) The component according to Claim 11, wherein a surface of the coating has needle-shaped $La_2O_3 - Ta_2O_5$ precipitates.

15. (Currently Amended) A method of protecting a silicon nitride (Si_3N_4) or silicon carbide (SiC) substrate against repeated thermal cycles at elevated temperatures, the method comprising:

mixing an additive including an oxide, compound, or ~~its~~ precursor thereof, of an element chosen from the group consisting of Al, Hf, Si, Ln (rare earth including whole lanthanum series and yttrium), Mg, Mo, Ni, Nb, Sr, and Ti, ~~and Zr to~~ with a quantity of tantalum oxide (Ta_2O_5) powder, wherein the quantity of tantalum oxide is greater than 40 mol% and wherein a presence of CaO is eliminated;

preheating the mixture; and

applying the heated mixture to the substrate.

16. (Original) The method according to Claim 15, further comprising firing the substrate and applied mixture to form a solidified protective coating on the substrate having a thickness between 0.5 to 10 mil.

17. (Currently Amended) The method according to Claim 15, wherein the additive includes aluminum oxide (Al_2O_3) in the range of about 1-50 mol% ~~is mixed with the Ta_2O_5 powder~~.

18. (Currently Amended) The method according to Claim 15, wherein the additive includes La_2O_3[[.]] in the range of about 1-10 mol% ~~is mixed with the Ta_2O_6~~.

19. (Original) The method according to Claim 15, wherein the mixture is preheated to a temperature of about 1000°C before applying the mixture to the substrate

20. (Original) The method according to Claim 15, further comprising heating the mixture to a temperature of about 1600°C and then grinding the mixture before applying the mixture to the substrate.

21. (New) The component of Claim 1 wherein the amount of tantalum oxide is greater than about 50 mol%.

22. (New) The component of Claim 1 wherein the amount of tantalum oxide is greater than about 25 mol%.

23. (New) A component comprising:

a silicon-based substrate; and

a protective coating for the substrate, the protective coating including tantalum oxide (Ta_2O_5) and La_2O_3 for suppressing transformation from beta Ta_2O_5 to alpha Ta_2O_5, the La_2O_3 being in the range of about 1-10 mol% before application of the coating;

wherein the protective coating further includes is an oxide, compound, or precursor thereof, of an element chosen from the group consisting of Al, Hf, Si, Ln (rare earth including whole lanthanum series and yttrium), Mg, Mo, Ni, Nb, Sr, and Ti.

24. (New) The component according to Claim 23, wherein the coating further includes an additive selected from the group consisting of nitrides, carbides, borides and silicides.

25. (New) A method of applying a protective coating onto a silicon-based substrate, the method comprising:

mixing Ta_2O_5 powder with Al_2O_3 powder to create a ceramic mixture, wherein the Ta_2O_5 is at greater than about 40 mol%;

roughening the silicon-based substrate surface;

degreasing the silicon-based substrate surface;

preheating the silicon-based substrate to about 1000°C;

applying the ceramic mixture onto the silicon-based substrate surface with an air-plasma spraying process;

melting the ceramic mixture;

quenching the silicon-based substrate; and

solidifying the ceramic mixture into a protective coating.

26. (New) The method of claim 25, wherein the silicon-based substrate comprises silicon nitride (Si_3N_4).

27. (New) The method of claim 25, wherein the silicon-based substrate comprises silicon carbide (SiC).

28. (New) The method of claim 25, wherein the protective coating thickness is in the range of about 50 microns to about 250 microns.

29. (New) The method of claim 25, wherein the Al_2O_3 concentration is in the range of about 1 mol% to about 25 mol% before applying the ceramic mixture onto the silicon-based substrate.